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Injecting New Ideas and New Approaches in Defense Systems: Are 'Other Transactions' an Answer?

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INJECTING NEW IDEAS AND NEW APPROACHES IN DEFENSE SYSTEMS: ARE "OTHER TRANSACTIONS" AN ANSWER?

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Injecting New Ideas and New Approaches in Defense Systems: Are "Other Transactions" an Answer?

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Abstract

"Other Transactions" (OT) Authority permits a form of contracting for research, development and conducting prototype projects which is an alternative to military contracting under the Defense Acquisition Regulations and related statutes and regulations. This research shows that OT contracting can produce results better, more cheaply and more quickly than contracting under FAR. Moreover OT contracting has proved to be attractive to commercial firms that traditionally have spurned DoD R&D business and it has the potential to greatly expand the industrial base available to DoD. OT contracting has been limited by a number of factors. DoD acquisition personnel are generally poorly equipped to engage in free form OT contracting. OTs have also been restricted by a broad misperception of their potential and risks involved. There has been a tendency to restrict OTs to a niche role and to impose restrictions by regulation and statute. DoD could benefit greatly by expanding its use of OTs and recognizing them as an equal alternative to traditional contracting.

Introduction

Depending on who is doing the looking, a view of today's defense acquisition landscape might engender a variety of reactions. Some like Dr. Pangloss in Voltaire's *Candide* might see a system that, despite some imperfections, is the "best of all possible worlds." Others might see a cumbersome, arcane, virtually irrational system and ask "why?" Yet others foresee that with strong leadership, changes in culture, a "can-do attitude," and relatively minor changes in laws and regulations, a much improved system could be established. They ask "why not?"

The "best of all possible worlds" view asserts that the defense acquisition system has resulted in the United States military operating world-class weapons systems in virtually every category. How can you argue with that, they challenge. The counter argument is that defense systems cost too much, take too long, and though technically sophisticated, often do not actually meet the needs of the current operating environment. Moreover, US adversaries access commercially available technologies and incorporate them into makeshift weapons, and we are

hard pressed to keep up with rapidly changing threat environments. In the "why not" category is the argument that the US knows the weaknesses of the defense acquisition system. The weaknesses have been repeatedly studied over the decades, and they have resisted numerous reform attempts. It is clear that leadership and vision, culture change, getting rid of the deadwood (both unnecessary regulation and business as usual "just say no" personnel), and learning and incorporating the skills needed in the globalized, commercial market-place are the essentials to creating an acquisition system that meets 21st Century needs.

This research explores whether an alternative method of contracting available to the DoD ("Other Transactions") can be instrumental in answering why not have a rational acquisition system that leads to culture change and accesses a globalized, commercial market in order to satisfy defense needs. Can "other transactions" attract commercial companies ("non-traditional contractors") to participate in defense programs either on their own or in collaboration with traditional defense contractors? What are the obstacles to achieving that result? Will achieving that result solve significant problems of the defense acquisition process? Are there additional benefits from "other transactions" such as integrating the innovation of commercial firms with the experience of defense primes in major systems acquisitions?

Today's Challenges: Innovation and the Rapid Transition of Technology to Defense Capabilities

The Response to the Current Threat Environment

In the first decade of the 21st Century, the USS Cole was attacked in a foreign port; the United States was attacked on its own soil and was engaged in hot wars that evolved into counter-insurgency/nation-building operations in Afghanistan and Iraq and responded to a variety of other contingencies. The national security challenges of the period looked very different than those America faced in the Cold War or early post-Cold War period. The force structure, training and equipping of the US military all had to change to meet these new conditions.

The acquisition system was challenged by several new trends. One was the increased presence of civilian contractors going in "harm's way" to provide essential support to deployed military forces. Another was the prevalence of rapidly developing so-called asymmetrical threats. In Iraq, insurgents accessed readily available abandoned or imported munitions and combined with commercially available technologies created improvised explosive devices (IED). IEDs became characteristic of the conflict in Iraq, inflicting many American casualties and wrecking unarmored or lightly armored vehicles. A variety of suicide bombing techniques required new ways to ensure the security of military personnel and installations. The possibility of cyber-attacks on increasingly net-centric operations constantly looms as a potential catastrophic threat. Challenges such as understanding "human terrain" and battlefield forensics require skill sets and technology that may not be the strong suit of either military or defense industry professionals.

How did the Department of Defense acquisition system react to these new challenges? It inched away from business-as-usual and extemporized. The IED threat was met by the creation of Joint IED Defeat Organization and a Joint IED Defeat Fund (more than $4 billion in FY 2008). In addition to organizations previously established to rapidly demonstrate and transition new capabilities (e.g., Advanced Concept Technology Demonstrations and Joint Technology Demonstrations within USD for AT&L), new offices, projects and funding lines outside the

traditional acquisition process proliferated. A number of these were created within the Office of the Secretary of Defense (OSD), while others were created within the Military Departments. Within OSD, one of these was the Rapid Reaction Technology Office. The military services had funding elements (and corresponding program offices) titled Rapid Equipping Soldier Support (Army), Rapid Technology Transition (Navy), and Warfighter Rapid Acquisition Program (Air Force). By some counts there were two dozen of these "rapid" or "agile" acquisition or transition programs. One term applied to these offices and programs ("Heinz 57") suggested there were even more than that. In addition, alternatives to the main requirements process were created (e.g., Joint Urgent Operational Needs process and Joint Rapid Acquisition Cell) and budgeting alternatives (e.g., JIEDDO transfer account) were created.

It is not the purpose of this research to assess the effectiveness of the numerous rapid/agile acquisition programs that exist as partial alternatives to the formal acquisition system. The continued existence of these organizations once supplemental war funding and immediate threats in Iraq and Afghanistan diminish is uncertain. The mere existence of so many alternative programs is evidence that the traditional system is not deemed to be either rapid or agile or able to meet critical needs of troops in combat.

Globalization and the Commercial World

Some argue that the western world is in a post-industrial era, an information age. Whether that is a proper characterization or not, it is clear that even in what were once called third-world countries industrialization and information technology are proceeding apace. Thomas Friedman (2005) pointed out that we are living in an increasingly "flat" world. Internet access and other forms of communication technologies are on the increase. Even adversaries in remote regions can make use of modern technology.

US adversaries not only have access to information and communications technology. They also have access via the commercial market place to products that can become asymmetrical military threats. In the fight against IEDs, it was found that some devices incorporating simple garage-door opener technology could be adapted to detonate explosives. Once simple threats were countered, US adversaries accessed more sophisticated technology. Even unmanned aerial vehicles can be purchased commercially.

Commercial technology is not only a threat but it is an opportunity. Industrial research and development involves billions of dollars of investments. Much of it is relevant to defense systems. Civil-military integration policy exists in law (*USC*, 1988). It is one of those policies more often honored in the breach than in the observance. The contracting regulations state a preference for commercial products and non-developmental items.[1] However, when it comes to integrating commercial technologies and systems into weapons systems, the DoD has generally done a poor job (Defense Science Board, 2009, pp. 9-14). "Commercial" in this sense implies the products and technologies of commercial industry in the general industrial base and global economy—in contrast to products developed by the defense industry under government imposed regulations, standards and processes.

[1] *Federal Acquisition Regulation* or *FAR* (Title 18 Code of Federal Regulations) 12.101(b), policy for acquiring major weapons systems as commercial items (requires a SECDEF determination) is found at *DFARS* 234.7002.

The Government Accountability Office has pointed out that the DoD has an opportunity to improve its processes of transitioning technology into fielded systems and capabilities by learning from the best practices of commercial industry (GAO, 1999). Again, "commercial industry" is the broader industrial base (unconstrained by government imposed procurement regulations and processes). Commercial industry tends to launch new products only when they embody relatively mature technologies. Cycle-times between improved versions of products are relatively short, often a few years or even months compared to DoD cycle-times of several years.[2]

Innovation

The evolving nature of national security threats and challenges combined with globalization and commercialization of high technology products and services means merely being good at what the DoD has been good at in the past is no longer good enough. If, like Dr. Pangloss, the DoD is comfortable with the acquisition world as it is, it will surely end up between a rock and hard place. One aspect of the problem is dealing with an uncertain future in which the nature of threats cannot be forecast in advance and in which threats change quickly. This requires not only a rapid acquisition process but one where innovation (including innovations in products and capabilities not traditional to DoD) takes place. This need for a vibrant "innovation cycle" should make the fast cycle-times of commercial industry as well as that industry's huge investments in research and development very attractive to the DoD. Unfortunately, so far the DoD has not implemented a truly effective strategy to emulate the commercial sector nor to leverage its investments through mutually beneficial collaboration. Secretary of Defense Gates has articulated the need to be "more innovative" and "bold" in meeting emerging threats but the challenge to actually do it is daunting (Erwin, 2008).

The System for Acquiring Defense Capabilities

"Big A" and "Little A" Acquisition

It is common in speaking of the defense acquisition process to distinguish "Big A" acquisition from "Little A" acquisition. The big acquisition process encompasses (1) requirements generation primarily exemplified by the Joint Capabilities Integration and Development System (JCIDS) in the formal process; (2) the budget planning and oversight process under the Planning, Programming and Budget Execution (PPBE) process; and (3) the contracting process under *DoD Instruction 5000.2* and the *Federal Acquisition Regulation*. The third area is "acquisition" in the narrow sense (Little A) a primary focus of which is the actual process of buying goods and services (procurement) but also includes testing and other functions. Describing the acquisition system as divided between "Big A" and "Little A" may have value but there are many inter-dependencies between processes that fall within one part of the

[2] It has been argued (by the Packard Commission among others) that the DoD's unreasonably long acquisition cycle is a central problem leading to many other problems (Ward & Quaid, 2006, p. 14). The same article points out that the automotive industry reduced its average development cycle-times from nearly eight years to less than two years in the thirty years before the turn of the century. During the same period DoD development cycle-times rose from as low as five to six years (Air Force and Navy) to eight to ten years for all services (p. 16).

system and another. Thus, while this research focuses on a contracting method ("other transactions"), it should be kept in mind that contracting techniques affect, and are affected by, requirements processes and budget processes.

The Defense Industry

Before World War II, the defense industry was relatively small. The government had its own arsenals and shipyards dedicated to developing and producing weapons. Industrial firms also supplied many of the military's needs, but few of them relied solely or primarily on the military as their principal market. During World War II, major industrial firms were mobilized to supply the weapons needed by the military. After the war, most of the firms that had been converted to defense production returned to their former lines of business. As the post-war period chilled into a Cold War, a specialized defense industry began to emerge. It supplied the high tech weaponry and technology that was then unique to the military–jet engines, nuclear materials, sophisticated electronics, advanced materials, and radar, for example.

Today, few areas of high technology are unique to the military, and the non-military commercial sector invests in research and development and introduces or upgrades innovative products rapidly. A comparison of DoD research and development contract awards as reported in *Federal Contract Reports* (and other sources) with industry segment leaders (as identified in *Fortune* magazine) shows that top firms receiving DoD RDT&E awards are not leaders in any industry segment except defense and aerospace. Moreover, leaders in high-tech industry sectors other than defense and aerospace receive little if any DoD RDT&E funding. They do, however, make major investments in R&D. This and other evidence shows that the defense industry is segregated from the broader national industrial base (Spreng, 2008).[3] This segregation is not based on specialized technology needs of the defense industrial base but on government-unique business practices imposed on defense companies via the DoD acquisition system. This is the reason why the decline in defense spending at the end of the Cold War resulted in a consolidation of the defense industry. Defense companies were generally not in a position to diversify into commercial markets because they were burdened with government-imposed business practices that made them non-competitive in the commercial marketplace (Gansler, 1995, pp. 23-24; Daly, 1994).

The DoD recognizes the value of dealing with a broader industrial base and often tries to take advantage of existing commercial systems or emerging commercial technologies that can be adapted to defense purposes. However, in doing so, the DoD often requires the commercial supplier to partner, typically in the subordinate position of subcontractor, with a traditional defense contractor familiar with DoD contracting procedures. This approach has resulted in some recent high profile failures that have been studied and documented by the Defense Science Board (Defense Science Board, 2009). DoD's imposition of government-unique requirements has been demonstrated to add to program costs, while the utility (benefit

[3] Robert Spreng (former President, Integrated Dual-use Commercial Companies) has conducted and published the results of many similar comparisons and other related research since the 1990s. See for example, Spreng, R. (1995, February). Commercial firms are conspicuously absent from top defense contractors. *National Defense*, p. 3.

compared to cost) of many government-unique business practices are open to question.[4] Many of the government-unique requirements are imposed in the contracting process and appear in contract specifications or terms and conditions, including those mandated by contracting laws or regulations.

Research Findings—General

"Other Transactions"—Background

There is a long history of the military resisting new ideas, concepts and technologies. Napoleon's preference for the smooth bore musket over the rifle, the Navy's reticence to fund the construction of the Monitor, or the years it took the Army to contract with the Wright brothers to demonstrate the aeroplane are historical examples. In the latter case, the inflexibility of the applicable contracting regulations proved to be part of the problem. A partial fix to the inflexibility of the contracting statutes, when applied to research, development and purchases for experimental purposes, came with enactment of the Air Corps Act of 1926 and later with emergency exceptions to the general procurement laws in place for the duration of World War II. A more comprehensive solution came in 1947 with enactment of the Armed Services Procurement Act. The promised flexibility of that statute was soon restricted by narrow implementing regulations (today embodied in the *Federal Acquisition Regulation* and its supplements) and additional legislation (Nagle, 1992, pp. 468-471). In 1958, additional flexibility was sought and resulted in an alternative approach under the Grant Statute. As implemented, however, this non-procurement authority was restricted to basic and applied research with academic and non-profit research institutions.

An important milestone was reached in 1958 with enactment of the National Aeronautics and Space Act. Section 203 (c) of that statute authorized a variety of contractual actions including: "such *other transactions* as may be necessary." In addition to utilizing the basic contracting laws, NASA used this alternative authority selectively to enter into a variety of innovative contractual relationships with the interpretation that the contracting laws did not apply to "other transactions" (usually referred to as "Space Act agreements"). The first active communications satellite was actually privately owned and developed at no expense to NASA, which launched the satellite on a reimbursable basis for AT&T. The technical reports on Telstar that the author delivered to NASA looked exactly like technical reports delivered under a government procurement contract. The relationship between NASA and AT&T became a model for a class of "other transactions" called launch service agreements. Over the years, NASA has found many applications for "other transactions" structured as funded, unfunded or reimbursable arrangements.

In the late 1970s, the enactment of the *Federal Grant and Cooperative Act* distinguished purchasing under the basic contracting laws ("procurement") from grants and cooperative agreements ("assistance"). Procurement (purchasing goods and services for the direct benefit

[4] Lovell et al., (2003). *An Overview of Acquisition Reform Cost Savings Estimates*, RAND summarizes a number of reports estimating the added cost of government-unique requirements at 10% to 50%. A Coopers & Librand report (*The DoD Regulatory Cost Premium: A Quantitative Assessment*, 1994), probably the most disciplined in methodology, placed the added cost at 18%. Both the Lovell study and a GAO report, *Efforts to Reduce the Cost to Manage and Oversee DoD Contracts* (GAO/NSAID-96-106), indicated that DoD's acquisition reform attempts had done little to reduce the regulatory cost premium.

and use of the government) was regulated by contracting statutes and acquisition regulations. Assistance (supporting and stimulating a recipient for a public purpose) was regulated by Office of Management and Budget (OMB) circulars and certain non-procurement statutes. NASA took the position that its "other transactions" constituted arrangements outside both systems. OMB concurred. NASA continued to enter into Space Act agreements not subject to the procurement laws and regulations, statutes such as the *Bayh-Dole Act* (patent rights), or the OMB circulars covering assistance relationships.

DoD "Other Transactions"

In 1989, the Defense Advanced Research Projects Agency (DARPA) sought and received authority to enter into "other transactions" (OTs) to support basic, applied and advanced research. This authority could be used when *standard* procurement contracts and grants were not feasible or appropriate. This criterion posed little difficulty considering the subject matter of the authority (basic, applied and advanced research), since such activities, while mission oriented, are seldom executed for the primary purpose of acquiring goods and services but have motives such as the acquisition of knowledge, establishing standards or proofs of concept, engendering scientific collaboration and other purposes. Equal cost sharing was not a requirement but was to be considered to the extent *practicable*. This practicability standard was not an inhibitor when flexibly applied by DARPA but tended to become applied bureaucratically when the authority extended beyond DARPA.

In 1994, DARPA received additional authority to carry out prototype projects directly relevant to weapon systems using "other transactions" which were not subject to cost sharing and could be used even if a procurement contract was feasible and appropriate. Unlike the original authority which had a dual-use character and was also aimed at expanding the defense industrial base the prototype (or "Section 845") authority was specifically aimed at defense contractors and prototyping defense systems. This has been broadly misunderstood and subsequently resulted in an amendment in 2000 that required cost sharing or the involvement of non-traditional defense contractors (very narrowly defined) before a Section 845 project was authorized.[5] Section 845 could be used in situations in which a standard procurement contract was typically used; it is an alternative to a procurement contract.

Congress has been inconsistent in its support for "other transactions." The original DARPA authority was, after a trial period, made permanent and expanded to the DoD as a whole. Section 845 authority was expanded to the military departments but subsequently encumbered with the restrictions noted above. In 2004, Congress again expanded the authority by authorizing a non-competitive award of a follow-on production contract after a competitively awarded Section 845 prototype project. Section 845 and the follow-on production authority have never been made permanent and are subject to sunset provisions. There have been high-level endorsements of OTs within the DoD on several occasions, but the "bureaucracy" does not

[5] See the notes in the *United States Code* following Section *10 USC 2371*, for the legislative evolution of DoD OTs.

know quite how to deal with them and has written regulations that arguably restrict the potential flexibility of OTs.[6]

Types of "Other Transactions"

Under OT authority a variety of contractual arrangements can be structured. Many OTs look similar to procurement contracts or research grants with the distinction that certain terms and conditions mandated by contracting or assistance regulations are not applicable and in those areas mutually beneficial terms and conditions can be negotiated unfettered by "one-size fits all" rules.

This is not a very imaginative use of OT authority, but it is potentially important in situations in which the recipient of the OT is a traditional defense contractor familiar with *FAR*-based contracting and the primary value of the OT is avoiding flow-down requirements that would be unattractive to a potential subcontractor familiar with commercial practice or a venture capital-supported start up company to whom *FAR*-based contracting is either unfamiliar or unattractive.

Beyond the use of OTs outlined in the preceding paragraph, the authority has been used in some creative and innovative ways. Forms of competition invented for particular programs or a class of programs can be structured unconstrained by contracting statutes and regulations. OTs have been used to structure joint funding arrangements where the DoD and industrial firms pool their funds to sponsor third parties in research that addresses common problems. Innovative systems produced through government research funding that the government is unable or unwilling to use as an operational system can be commercialized, and the government can gain the benefit of its investment through access to the commercial product (and potentially receive payments as a result of successful commercialization). A variety of consortia arrangements can be formulated to bring together a sufficient mass and variety of intellectual power to address difficult problems. Consortia thus formed need not have a "prime contractor" when formed via an OT. Prototype projects can be formed when the industry "team" is a true team and leadership of the project changes as it proceeds through various phases and when one performer may have the skills necessary to manage a particular phase. Several OT consortia have been formed to bring together expert capabilities in particular fields of technology (highly energetic materials; robotics; chemical, radiological and biological threats) and have been able to respond to emerging threats or opportunities by getting new projects started in days rather than weeks, months or years.

Critics of "Other Transactions"

It is worth noting that OTs have their critics. The author met with DoD's senior official for procurement and acquisition policy last summer. During the course of that meeting, the official stridently and authoritatively asserted that the three most wasteful acquisition programs in the Department's history were Section 845 OT programs, citing C-17, LPD-17 and FCS. Two were

[6] High-level endorsement—for example former USD (AT&L) Paul Kaminski personally signed an innovative OT, and, more recently, John Young heartily endorsed an "Open Business Cell" that among other things would specialize in OT contracting. Regulations—the DoD Grants and Agreements Regulatory System; and, "Guidelines" for Section 845 agreements issued by the Director, Defense Procurement and Acquisition Policy.

actually conducted as traditional procurement programs, not OTs. The third, FCS, was a troubled program that was initiated as an OT. However, analytical studies of that program concluded its problems had nothing to do with being conducted as an OT, and in fact, the program benefitted from initially being conducted as an OT. It turns out that the vociferous and inaccurate denunciation of OTs witnessed by the author was not an isolated incident. The author interviewed a GS-15 former employee of that office who had been brought in to oversee OT policy. The employee related that on arrival his supervisor greeted him with diatribe against OTs, citing Arsenal Ship as the prime example. That program is included among the case studies below. It was a well-executed program that was cancelled for reasons having nothing to do with its being conducted as an OT.

The DoD Inspector General's office has issued reports on OTs that contain criticisms of OTs of varying degrees of substance. Generally these criticisms fail to demonstrate an understanding of OTs; and, the essence of the criticism is usually that OTs are not business as usual and their use is not justified. The IG reports often contain a comment that the traditional system has "served us well." They never state that there is a financial cost to operating under the government-unique rules of the traditional system. They also fail to note the isolation of the defense industry caused by government-mandated business practices. Finally, IG criticism follows a consistent trend in which the IG has been dubious of acquisition reform in general.[7]

One of the most highly publicized critics of OTs was Kenneth F. Boehm, chairman of the National Legal and Policy Center who, in March 2005, testified before the Senate Armed Services Committee concerning Boeing's OT agreement in the Army's Future Combat System (FCS) program. Boehm's testimony was filled with examples of abuse, a litany of statutes from which OTs are exempt, and the abuses that could occur. A careful reading of the testimony shows that Boehm's numerous examples of abuse (the Darleen Druyun case included) were not specifically related to the FCS OT agreement. In fact Boehm merely cited examples of "safeguards" from which an OT might be exempt. Boehm never testified to any connection between his examples of abuse and the actual OT agreement. One gets the distinct impression from his testimony that Boehm never actually read the OT agreement. If he had conducted an intellectually disciplined and forthright inquiry, he would have known that the FCS OT contained nearly one hundred *FAR* clauses, and the issues he raised were more hypothetical than real and in the FCS context his testimony was bogus. In contrast, the witness from the Government Accountability Office (Paul L. Francis) found problems in the FCS program but did not include the OT agreement among them. Moreover, a study of the FCS OT agreement by David R. Graham for the Institute for Defense Analyses found a number of benefits flowing from the agreement, among which were the ability of Boeing to deal with innovative companies that might not have participated in FCS under a procurement contract.

Most credible research studies of OTs have found multiple benefits of OTs and few if any negatives. However, one research paper sponsored by the Naval Postgraduate School did find that the version of OTs called Technology Investment Agreements (TIA) had generally

[7] An example of the DoD IG anti-acquisition reform position is Derek Vander Schaaf, (1995, August 3). *Debunking myths of acquisition reform*. Prepared testimony before US House of Representatives, Small Business Committee. An example of an IG report is DoD. (2001, March 19). *Management of the commercial operations and support savings initiative* (DoD IG, D-2001-081).

failed (data to FY2000) to attract the participation of for-profit commercial firms (Tucker, 2002).[8] Subsequent research shows, that to the extent this finding was accurate for the period reviewed, it is no longer valid (data to FY2006) (Ablard et al., 2007, pp. 2-15). Moreover the finding in the Naval Postgraduate School paper is inconsistent with earlier studies of OTs (prior to the use of the TIA terminology).

In addition to outright criticism, some studies of OTs have noted concerns about OTs raised by government personnel. The most commonly identified concerns are government loss of intellectual property rights, absence of cost standards, and unavailability of metrics for success. These and other concerns remain essentially theoretical, as they have not been documented as actual problems by knowledgeable personnel who have participated in the execution of OTs. All are issues that can be intelligently dealt with in the negotiation process.

Research Findings—Case Studies

Maritime Fire Support Demonstrator (MFSD)

Originally called Arsenal Ship, the MFSD program was a joint DARPA/Navy Section 845 prototype project to demonstrate massive precision fire support (up to 500 vertical launch cells) as well as a variety of acquisition reform techniques.[9] The demonstrator ship was to be capable of being converted to a fully operational fleet asset and of becoming the lead ship for a fleet of up to five additional ships. Technically, the ship was to have on-board or off-board control via Cooperative Engagement Capability; was to demonstrate new approaches to damage control; and was to reduce cost of ownership through innovative maintenance and operating procedures and an exceedingly small crew size. A Unit Sailaway Price ($550 million for the production vessels) was established, and all technical decisions had to be made in the context of both the established acquisition cost and projected lifecycle cost. Starting from award of five concept development phase agreements in July 1996, the program was on track to have the test article in the water, ready for testing, in October 2000 when it was cancelled at the end of 1997.

According to the Arsenal Ship lessons-learned report,

> [The] process being followed by Arsenal Ship demonstrated a 50% reduction in acquisition time for the design portion of the ship compared to the traditional approach[…] This was primarily enabled by using an industry led acquisition [approach] operating under Section 845 authority, with industry having full trade space and responsibility for the design.

The “price as established” trade-off technique spurred innovation and drove down acquisition cost, albeit at some added risk. Summarized findings from the lessons-learned report include that an industry-led design competition could be more meaningful than a government analysis of alternatives. Industry proved to be fully capable of designing a complex

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[8] Data collected for DoD’s FY 2006 report to Congress on OT’s (Via DD form 2759) showed 91% of 116 Section 845 OTs had involvement by a total 185 non-traditional contractors (under a very narrow definition of non-traditional).

[9] The primary sources for this case study are Hamilton (1997) and the author’s personal knowledge of the program and interaction with program participants. Charles Hamilton (RADM., USN, Ret.) reviewed and provided comments on this case study.

Navy ship. Minimum government direction was a key factor in success. When unique industry teaming arrangements are encouraged, adequate time is needed for industry team formation and growth (teams with "cradle to grave" capabilities were required). Section 845 permitted "try before you buy" for Navy ships with no time lost to full production.

In light of the foregoing brief summary, one might ask: if Arsenal Ship was so great, why was it cancelled? With the death of Chief of Naval Operations ADM Jeremy Boorda early in the program, Arsenal Ship lost its chief proponent within the Navy. Arsenal Ship was revolutionary. It was (according to Norman Polmar) the first truly new concept in warships since the ballistic missile submarine. The potential capabilities of Arsenal Ship competed with the submarine navy, which was then seeking to establish new roles, and the aircraft carrier force, which believed it had the primary role of providing support to expeditionary ground forces. One can speculate that Arsenal Ship was viewed as a threat by some of the Navy's key submarine and air admirals (or merely closely associated with their former nemesis ADM Boorda), as well as a number of other vested interests. A relatively small shortfall in one year of Arsenal Ship's funding profile provided an opportunity to terminate the program. More generously, perhaps, the Director of DARPA ascribed the failure to correct the funding shortfall to Navy mismanagement of the budget process.

In the wake of the cancellation of Arsenal Ship, it is well to remember that the Navy's Program Executive Officer (Ships), RADM Charles S. Hamilton, stated at this conference a few years ago that the Arsenal Ship experience revolutionized the way the Navy thinks about warship design and development. In addition, the Arsenal Ship program left many other legacies, including a more affordable and more capable Mark 41 Vertical Launch System. Both acquisition approaches pioneered with Arsenal Ship and a large amount of technology developed under the program found their way into subsequent Navy shipbuilding efforts. Despite its cancellation, Arsenal Ship proved to be an excellent value.

Future Combat System (Early Phases)

FCS is a major Army modernization program. Following some initial work done by DARPA, the Army continued FCS as a Section 845 OT before transitioning it to traditional contracting.[10] FCS joins an array of manned and unmanned systems connected through a common communications network, allowing a flexible and modular response to threats in complex environments.

The FCS OT allowed for fast progress to be made in concept development and enabling technologies while a competition to select a lead systems integrator (LSI) was undertaken. Prior to selection of the LSI, notable innovation was observed through the efforts of non-traditional contractors—especially iRobotics and Austin Information Systems. The OT proved very adaptable to program changes that occurred frequently because of tradeoffs and the evolving nature of the huge and multifaceted program. The degree of involvement of the Army user community was unprecedented. Rapid prototyping and development of manufacturing capabilities occurred. Commercial technologies in existence and under development were effectively transitioned into the program. FCS is currently transitioning important capabilities to ground forces in action in Iraq and Afghanistan.

[10] Sources for this study include the LMI report (note 17), App. C 12-14; testimony in Senate hearings; conversation with a program participant, and GAO and IDA reports referred to in the "Criticism" section of this paper and helpful comments by Hon. Claude Bolton, former Assistant Secretary of the Army.

A deficiency in this program was a profound need for training of Army acquisition personnel unused to the flexibility of Section 845 contracting. Another problem was the LSI selected for FCS was Boeing—which was soon being highlighted as a poster-child of corruption in the defense industry. The association of Boeing with the Army's highest profile development program and its execution under an OT resulted in bad publicity and an unjustified correlation between OTs and unethical conduct by defense contractors. This has had a profound negative effect on the perception of OTs.

Case Study—Joint Unmanned Combat Air Systems (JUCAS) at DARPA

DARPA, the Air Force and the Navy combined to develop a system of highly capable unmanned combat air vehicles networked through a common operating system.[11] These vehicles are to penetrate deep into high-threat environments, be survivable and constitute a persistent combat capability. The program involved major defense companies, Boeing and Northrop, as well as significant roles for non-traditional contractors.

Cost was reduced in this program because both major contractors organized their efforts as IR&D projects (allowed under OTs: government payments off-set IR&D balances), eliminating general and administrative expenses; facilities capital and cost of money; fee; and reducing labor and material rates by about 15%. In addition Boeing invested about $300 million in the effort. Cost was also saved because the streamlined management and change-order processes adopted were estimated to reduce schedule by more than a year.

The flexibility of the OT helped attract non-traditional companies to the project. Some were unique, including a supplier of composite materials whose main line of business was manufacturing surfboards. In the case of Northrop Grumman non-traditional companies provided essential capabilities. The differing nature of the participants and highly innovative nature of the project operating at close to the state-of-the-art resulted in adjustments in industry's position on intellectual property matters. The OT could accommodate flexible IP arrangements.

The project was financed through payable milestones, which both improved cash flow and focused the project on key technical accomplishments. Milestone payments incentivized contractors to achieve observable results at less-than-estimated cost. Milestones were modified in the light of experience. This type flexibility would have been difficult to achieve under a *FAR* contract with inflexible contract line item numbers.

As in FCS, a need for training and culture change was noted, in this case by both government and industry personnel. Government personnel tried to regulate in a business-as-usual mode rather than to collaborate in a manner consistent with the vision of the program's leadership. Unlike FCS, there was inadequate effort devoted to identifying and engaging the potential user community.

In 2005, DARPA was confronted with a problem created by Congress. The original JUCAS OTs with Boeing and Northrop were nearing the end of their terms. As a result of an amendment to Section 845 in 2000, new Section 845 agreements would require either 1/3 cost sharing or an upfront determination that non-traditional contractors (defined in an exceedingly

[11] Sources for this study include the LMI report (note 17), App. C 1-3; the author's personal knowledge of the program and interactions with both government and industry participants.

narrow fashion) would be “significantly” involved in the program. Since cost sharing was unlikely and an *a priori* determination of significant non-traditional involvement could not be made for the next phase of the program, DARPA planned to award a traditional procurement contract for that phase. The program successfully transitioned from the DARPA joint program office to Air Force leadership before that occurred. The subsequent history of the program under the Air Force is not part of this case study.

Chemical, Biological and Radiological Technology Alliance (CBRTA)

The CBRTA was part of a multifaceted consortium (National Technology Alliance) authorized by Congress to inject commercial technologies for security and defense needs.[12] It consisted of thirteen commercial firms and academic institutions, awarded under an OT agreement, with 3M leading the consortium in an administrative capacity. The National Geospatial-Intelligence Agency (NGA) acted as executive agent and provided the contracting support.

CBRTA afforded the government access to a reservoir of intellectual talent consisting of thousands of the best and brightest scientists and engineers employed by the CBRTA-member companies and institutions. Projects were initiated as a modification to the basic agreement and were in the form of task orders. Because industry could formulate a program plan in response to a government need in a matter of days (potentially hours), work could begin under an approved plan almost as quickly. Work could be performed by members of the Alliance or subcontracted if the requisite expertise existed outside CBRTA companies.

Administrative costs were funded separately from R&D efforts. Most projects were funded as time and materials efforts, while others were either cost-reimbursement or fixed-price milestones. The government obtains the leverage of industry investment—which was often five or ten times that of the government in many of the technologies supported by CBRTA member companies. Project time was shortened due to the reduced need for cost and pricing data, elimination of a formal engineering change process, and simplified terms and conditions with suppliers—all due to the fact that the OT instrument included these terms and conditions.

This type of consortium embraces non-traditional participants both as members of the consortium and also in the subcontract role. OT allows flexibility in intellectual property and freedom from government-unique requirements such as hourly timecard reporting and DCAA compliance, which would be absolute nonstarters for many of the companies and scientists involved in CBRTA projects.

The CBRTA operated as a highly successful program for several years. It was a potential model that could be applied to many technology areas relevant to DoD needs.

However, chemical, biological and radiological technology was not a main interest of its executing agent, the NGA (CBRTA funding came primarily from agencies other than NGA). A supportive NGA director early on was succeeded by a director uninterested in CBRTA. Even

[12] Sources for this study include Daly et al., *CBRTA: Six Years of Operation*, (briefing Aug. 2008); the LMI report (note 17), App. C 7-8; and, conversations with program participants. Richard Kuyath, counsel, and George Sundem, contracting officer, of 3M Company, provided helpful comments on this case study. Review and additional comments were provided by Kathleen Harger, former Assistant Deputy Undersecretary of Defense (Innovation & Technology Transition).

more disheartening to industry and damaging to the previous efficiency of CBRTA was the assignment of a new NGA legal counsel in an oversight role who lack a background in OTs to oversee CBRTA. Agreement modifications were subjected to legal reviews that took much longer than previously. This attitude seemed to infect Agreements Officers responsible for administering the OT. Issues between CBRTA and the government that had previously been raised and resolved were reopened, and the government (new legal counsel) took a more restrictive view than previously held. As of this writing, the CBRTA agreement has expired with faint hope that it will be resuscitated. A highly successful program with virtually unlimited potential to provide the government with novel solutions has been allowed to lapse.

Hummingbird Unmanned Aerial Vehicle

The A-160 Hummingbird UAV is a rotor-craft built by Frontier Systems, a small non-traditional contractor.[13] It incorporates revolutionary rotor technology and is intended for reconnaissance; surveillance; target acquisition; communications relay; and precision resupply missions in autonomous operation. It has long endurance and can fly thousands of feet higher than conventional helicopters. Hummingbird has successfully undergone flight tests and is under active consideration for use in a number of operational applications.

The Section 845 OT proved to be very cost-effective. It enabled dealing with the small commercial firm and, particularly, held down cost in the early R&D phase. Cost savings additionally accrued through time savings in both the pre- and post-award phases and as a result of the streamlined changes process. This work would not have occurred under a *FAR*-based contract. Frontier Systems would not have accepted such a contract.

Particularly important in this case was flexibility in intellectual property, especially patent rights, as Frontier has patented inventions related to its revolutionary rotor technology. The flexibility of an OT to accommodate the needs of a performer with specific needs or revolutionary ideas of importance to DoD was demonstrated in this project.

This was a case where an OT was essential to gain access to a technology controlled by a small, non-traditional contractor. An acquisition team well-schooled in OT contracting was critical to successfully dealing with this contractor. Business-as-usual or on-the-job training would not have worked in this case. This may be a case where the follow-on production authority provided by Congress in 2004 (or a modified version of it) would prove particularly useful.

Dual-use and Commercial Operations and Support Savings Initiative (COSSI)

The previous case studies have highlighted individual Section 845 OT programs.[14] Major successes have also been achieved in broad programs involving hundreds of agreements, including DoD's dual-use technology programs (originally the DARPA-led Technology

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[13] Based on LMI report (note 17), App. C 5-7.

[14] Based on Gray et al. (1996). *Dual use research project report*. Arlington, VA: Potomac Institute for Policy Studies; LMI report (note 17), App. C 9-11; the author's personal involvement in these programs and conversations with program participants; former Deputy Assistant Secretary of the Navy (and former Assistant Deputy Undersecretary of Defense responsible for COSSI). Michael McGrath provided insightful comments.

Reinvestment Project) and COSSI. The dual-use programs used the original (*10 USC 2371*) OT authority, and COSSI was executed using a combination of the original authority and Section 845 OT agreements. The interesting thing about both the dual-use programs and COSSI is that despite achieving a record of success, both have been allowed to fade away. Although vestiges of both programs persist, neither exists as a coherent entity. When programs are successfully piloted at the Office of Secretary of Defense level, there is no guarantee of their institutionalization or continued existence when they are transitioned to the military departments. Business-as-usual attitudes and the budget priorities of the individual services seem to trump innovative approaches, opening the technology base to new entrants, and cost savings.

DARPA's success in promoting dual-use technologies (those with both commercial and military applications) through cost-shared collaborations with commercial firms using OT contracting was such that it led a distinguished panel under retired Marine General Al Gray to recommend the dual-use approach as the DoD's primary means of undertaking new technology developments. Other reports also found that these OT programs were highly successful.

COSSI was a program started in 1997 that aimed to reduce operations and support costs by replacing (often expensive and outdated) military-specific components in DoD systems with components adapted from commercial products or technology. The program was premised on the DoD funding the modification, testing and adaptation of the commercial component for military needs on a cost-shared basis, while the commercial partner gained the promise of a fixed-price procurement if the savings was successfully demonstrated. Since OT production authority did not exist, COSSI was designed to use *FAR* Part 12 commercial item contracts for the follow-on procurement. COSSI was successful in the sense that documented OS cost savings exceeding the government's R&D investment were realized, and eventually the program attracted considerable participation by non-traditional firms. However, the DoD's credibility suffered when, contrary to program guidelines, it refused to grant a preferred position to the cost-shared developer and either went out competitively to procure the improved component (often from a traditional defense contractor) or opted not to procure the improved item despite demonstrated cost savings. Eventually, COSSI died as a major program but episodically serves as a model that is put into use by various DoD components.

In both the dual-use programs and COSSI, flexibility in intellectual property rights and streamlined business practices were important to attracting commercial firms. These programs were competitive in nature, but the competitions held were more informal than competitions under Part 15 of the *FAR* and generally resembled the broad agency announcements.

Research Findings—Surveys and Data Collection

Data Sources

This part of the report summarizes and analyzes data collected via interviews, surveys, and other means. It includes research undertaken by a five-person team from the Logistics Management Institute led by John Ablard. This team included three members with many years of experience in DoD acquisition and assistance, including significant experience with OTs (aided by researchers experienced in survey techniques and statistical analysis). This team conducted interviews with twenty-six individuals representing industry and government and including both executives and program personnel. All persons interviewed had recent (as of 2007) experience with OTs. In addition, the responses to thirty questionnaires sent to government program managers and agreements officers were recorded and analyzed. In total,

the responses to the questionnaire represented experience on forty-six OT programs with some individuals having experience on more than one program. There was overlapping coverage by more than one respondent on some programs. The data collected by the LMI research team has been made available to other researchers, but as of this writing has not been formally released.

Another compilation of data summarized below was collected by Robert Spreng—the recently retired president of an industry association (Integrated Dual-Use Commercial Companies or IDCC) consisting of large commercial firms with significant R&D budgets that wish to collaborate with the DoD on R&D but which do not want to be subjected to onerous government-imposed requirements that are inconsistent with their normal business practices. Speng's data comes from two sources. Spreng has accessed and analyzed: (1) publically available information (his methodology is described in published articles cited in the footnotes) and (2) data from surveys of IDCC-member companies.

A final Section includes insights from interviews and surveys personally conducted by the author. This is supplemented by notable data uncovered during the author's literature review that is not reported elsewhere in this paper.

LMI Research Data

The top-level findings of the LMI research team were: (1) Persons with experience in using prototype (Section 845) and research OTs (TIA's) viewed them positively; (2) effective use of OTs offers benefits to R&D program managers as well as contracting officers; among the benefits attributed to prototype OTs are streamlining, flexibility, performance improvements, schedule reductions, and cost reductions; (3) use of OTs has given the DoD access to for-profit companies that traditionally do not do R&D business with the federal government; these entities' participation either alone or in consortia has been of significant value; (4) use of OTs is most effective in research and prototyping efforts or in certain programs developing manufacturing technology; and, (5) understanding and acceptance of OTs within the DoD needs to be improved so that the full benefits of these instruments can be realized.

Nearly two-thirds of respondents to the questionnaire stated that OTs reduced pre-award cycle-time, while nearly a quarter said it had no effect and a small minority said it caused an increase. Among those saying there was a decrease in pre-award cycle-time, there was unanimity that the administrative simplicity of OTs resulted in reduced time. Three-fifths of the respondents identified freedom from *FAR* competition standards, and an equal number thought project partners working together efficiently resulted in quick development of a research plan. Among the small number of respondents noting an increase in pre-award cycle-time, the unfamiliarity of offerors with OT contracting and time-consuming negotiations over intellectual property were identified as reasons by all respondents.

About three-fifths of respondents stated that use of OT authority reduced post-award program execution time; about two-fifths said it had no effect. Primary reasons given were: reduced administrative burden allowed more focus on technical research goals; minimum internal systems compliance requirements accelerated process; flexibility to restructure and make mid-course corrections created an efficient work environment; and lack of flow-down clauses sped up the process. About four-fifths of respondents stated that overall (pre- and post-award) OTs resulted in significant or moderate time reductions in their programs. Most of these (63.3%), however, thought the time reductions were only moderate.

Nearly three-fourths of respondents attributed cost reductions to the use of OT authority (compared to 6.7% saying OT increased cost). The top reason given was that tradeoffs allowed better use of available funds. Other top reasons were that shortened cycle-times reduced overall program cost; there were fewer non-value added activities; and use of cost sharing. In addition to reduction in current project cost, more than half the respondents stated use of the OT would result in reductions in future acquisition and support costs for their programs. With a single exception, the remainder of respondents thought use of an OT would have no effect on program costs.

In the area of performance of the systems or products resulting from their OT projects half the respondents said OT authority resulted in significant improvements in performance. Forty percent identified moderate performance improvements, while the remainder saw no impact on performance from using an OT.

More than four-fifths of respondents said that OTs had a positive impact on various aspects of the team relationships and practices. No respondents identified any negative impacts. Positive influences were found in relationship building among team members; focus on technical aspects of the program; management and control of the program; and other practices.

More than 90% of respondents found that OT authority resulted in a streamlined and flexible program. Reasons given included various accommodations of commercial practices including flexibility in negotiating technical data, computer software license rights; various auditing and cost practices; and, elimination of flow-down clauses. Another top factor was ease in making changes.

When asked to access the overall impact of OT authority on their projects 46.7% responded that it had a significant positive impact; 50.0% said it had a moderately positive overall impact; and one respondent (3.3%) said no impact. In addition, more than three-fourths of respondents answered affirmatively to the question, “Did use of OT authority allow development of program/s that may not otherwise have occurred?” These general findings, as well as many of the specifics derived from the survey of government personnel, were reinforced by information derived from interviews of government and industry personnel.

The survey responses summarized above are all the more remarkable in light of additional information LMI derived from its interviews. In nearly all the programs profiled in the interview process, a deficiency in training on OTs was noted. The deficiency sometimes related to both government and industry personnel and sometimes only to government personnel. In one major program, it was identified as “a compelling need.” Thus the benefits of OTs identified in the LMI study were documented despite the fact that these programs may not have been conducted by well-trained government personnel nor executed up to the full potential of OTs.

IDCC Research Data

Beginning in the early 1990s, Robert C. Spreng has conducted a series of studies showing the profound divide between the large defense contractors that receive the vast majority of DoD RDT&E awards and leading US industrial firms that receive little or insignificant DoD R&D funding. Spreng found that a handful of defense contractors account for half of the total DoD RDT&E awards, while adding a few more brings the total to three-quarters of all such funding. Of hundreds of top industrial firms (*Fortune* 500 or 900 firms in *Business Week* R&D Scoreboard), 92% receive little or no DoD research and development funding.

A review of the data sources that Robert Spreng has assessed provides details that are consistent with what former Defense Secretary William Perry and many other knowledgeable observers have said: namely that many technology areas the DoD depends upon—such as electronics, semi-conductors, and computer software to mention a few—have equivalents in the commercial sector, and there is no need to maintain defense-unique capabilities in those areas. However, ending reliance on defense-unique industrial capabilities requires that the DoD be able to access the equivalent commercial market.

IDCC has analyzed some of the government contracting practices that discourage their members' participation in government R&D programs or constitute barriers to entry. In a 2006 survey of IDCC member companies, eight of the top fifteen barriers identified related to intellectual property and three identified barriers to the way the government handled costs. In a 2008 survey, seven of the top fifteen barriers related to intellectual property and two were cost related.

Some of the issues identified were intellectual property rights/proprietary data concerns including trade secrets; Buy-American provisions/concerns with foreign technology/production; cost accounting standards; pass through requirements; profit policy; overhead policy; cost or pricing data; documentation; audit rights; and contract dispute resolution. Other issues were operational in nature such as awareness of business opportunities; work specification problems; government oversight problems; and billing problems. Many of industry's concerns flow from the requirements of the *Federal Acquisition Regulation* (or parallel provisions contained in assistance regulations). Other issues were related to the attitude and culture of government personnel involved in R&D contracting.

The IDCC has recommended expanded use of OTs as a way to address many of the concerns of its member companies. IDCC has noted that many government contracting personnel are not familiar with OTs or even with potential flexibility under the FAR with regard to matters such as technical data. The IDCC recommends the establishment and thorough training of a cadre of contracting officers who understand innovative contracting and are prepared to accommodate key imperatives of commercial companies. The IDCC has noted that typically their companies will not be prime-contractors and therefore the DoD needs to structure changes that will permit the participation of IDCC companies as subcontractors. Commercial firms such as IDCC member companies recognize the need for them to partner with traditional defense primes in order to participate in platform-centered defense systems acquisitions. They are willing to do this if appropriate terms can be structured.

Government policies embodied in legislation promote civil-military integration (*10 USC 2501*) and a preference for commercial products (*10 USC 2377*), but the years of IDCC efforts to open DoD R&D contracting to primarily commercial high-tech companies indicates these policies have been less than fully honored by the DoD in its approach to systems acquisition.

Other Research

In discussions with the former Assistant Deputy Undersecretary of Defense (Industrial Policy), it became clear to the author that IDCC companies do not have a monopoly on seeing barriers to entry in the government contracting system. Moreover, there is not just a single barrier or set of barriers to entry. Numerous interactions with representatives from companies and industry associations convinced the ADUSD (Industrial Policy) as well as the author that depending on the company or industry segment the barriers differed. Thus, no single magic bullet or tweak of the system will suddenly open up government procurement contracting to

much broader participation. The entire system is too arcane, prescriptive, and inflexible to be broadly attractive. As one expert observer noted, it is inconceivable that a rational person or committee of rational people charged with devising a contracting system for the federal government would possibly come up with our current system (Nagle, 1992, p. 519).

An example of a barrier caused by a single government requirement provides an informative illustration. According to the government contracts counsel of a major commercial company (multi-$billions in sales; in excess of $2 billion annually in R&D), his company created an accounting system compliant with government Cost Accounting Standards (CAS) so that it could receive government cost reimbursement contracts. The company was attracted to government R&D business due to patriotic motives, as well as to obtain government funds to expand its research capabilities, and also as a possible way to expand its markets (at 2% of sales, the government was already its largest single customer). With its CAS accounting system in place, the company was awarded and performed a number of DoD cost-reimbursement research contracts. The company's ability to obtain government contracts soon declined as its key scientists refused to write proposals for work that would require them to be subject to government requirements for hourly time reporting. The same scientists were, however, willing to do work under an OT without hourly time reporting. The notion that hourly time reporting was a sore point among highly motivated scientists was confirmed by the response to a survey question circulated by the author. One respondent was the executive director of an electro-optics industry association whose previous experience included management at a start-up company, work as a DARPA program manager, and attorney at law! He pointed out that experiments do not always fit into neat eight-hour segments. Hourly time reporting to a highly qualified scientist who is paid an annual salary seems artificial and redundant. In a variation on this theme, legal counsel for a large, highly innovative company advised the author that it was motivated to seek government R&D funding for the same reasons mentioned above. His company investigated setting up a CAS-compliant accounting system and made the determination that it was not worth the expense and effort involved. One additional variation on this theme was given in the 1990s by Martin-Marietta's Norman R. Augustine who included lack of "commercial accounting" in reasons why defense firms could not diversify into the commercial marketplace. Multiply this one example many dozens of times and one gets the Gordian knot of government contracting. Yet, OTs like Alexander's sword can unravel the conundrum.

The author was present at a 2008 briefing by an experienced program manager presented to an Office of Secretary of Defense task force that was considering funding a major prototype project involving a highly innovative airship application and that was seeking an appropriate program office to execute the program. The program manager represented one of the military Service's major development and contracting commands and had been asked to contrast a *FAR*-based approach with an OT approach. The program manager was supported by experienced contracting officials. The way the presentation was made suggested that the program manager had a superficial and stereotyped view of OTs and seemed to have difficulty understanding why anything other than business as usual made sense. Later it also came to light that getting management approval for an OT approach from that command would be a "hard sell."

There have been many reviews or research studies of OTs conducted since the 1990s. Examples of the small minority of reports that have been critical have been mentioned in the section on criticism in this paper. The vast majority of studies have found benefits flowing to the DoD from OTs, with any risks being either minor, manageable or both. Once OTs graduated beyond DARPA, a general deficiency in training and expertise in negotiating and executing OTs has been noted. Inaccurate perceptions, general misunderstanding, and false allegations about

OTs have become common among both policy makers and personnel potentially responsible for executing OTs. The LMI research has been highlighted in this paper because it is a recent and disciplined study of the subject. Its findings are generally consistent with many earlier studies.[15] The IDCC data is also of interest. Unfortunately, it merely represents views of companies that are interested in, and relatively educated about, potential pitfalls of doing business with the DoD. One respondent to a survey question circulated by the author pointed out that many companies including highly innovative companies supported by venture capital never consider doing R&D business with the DoD. Among many companies, DoD contracting has a reputation for being unthinking, bureaucratic and limited to companies that are "usual suspects."

Conclusions and Recommendations

Utility and Potential

OTs have demonstrated that they can be a better, faster, cheaper way to conduct defense research, development and prototype projects compared to using procurement contracts. They have demonstrated outstanding utility and benefit to DoD projects in basic, applied and advanced research; prototype projects relevant to weapons and weapons systems and, in distinctively innovative transactions. They are potentially applicable to transactions that have not yet been conceived. Far from being a niche authority, OTs are capable of being a fully acceptable alternative approach for many of the Department's science, technology and prototype projects. The potential of OTs to transition successful prototype projects seamlessly into production is limited under current legal authority. Amendments to Section 845 enacted in 2000 are inconsistent with original legislative intent and unduly restrictive.

It is recommended that the Undersecretary of Defense (Acquisition, Technology and Logistics) direct that DoD guidance on OTs for research and prototypes be revised to assure that OTs are considered a mainstream authority fully equal to *FAR* contracting and assistance instruments. Such guidance should clearly indicate research OTs may overlap the "assistance" category but are not confined by it. Guidance on both research and prototype OTs should stress their flexibility and minimize unnecessary regulatory restrictions. Delegations of authority to exercise or approve the use of OTs should be issued to effectuate vigorous use of OTs.

It is recommended that Congress repeal the 2000 amendment to Section 845 and restore it to its original intent. In lieu of complete repeal limitations on Section 845 should be substantially modified. If retained the definition of "non-traditional" contractor should be changed to a company whose main focus of business is in markets other than the DoD. Dollar amounts for approval requirements for OTs should be repealed. Follow-on production authority should be simplified.

[15] Studies go back to the early 1990s, e.g., Nash et al. (1995). *Participant views of other transactions.* Alexandria, VA: Institute for Defense Analyses; several have been conducted by RAND, e.g., Smith et al. (2003). *Assessing the use of other transactions for prototype projects.* National Defense Research Institute; and include research done at NPS, e.g., Wong & Liu. (2008). *Analysis of the transitioning opportunities for non-traditional contractors under other transactions authority* (MBA Professional Report). Monterey, CA: Naval Postgraduate School.

Subcontracts

A primary way to get innovative commercial companies involved in major defense programs is via subcontracts. Many commercial firms are unwilling to participate in defense procurement when flow-down clauses under the *FAR* system impose unattractive business practices on them. Many of the same firms will accept OT arrangements. The likely significant participation of a non-traditional firm as currently narrowly defined may not be known up front, so many programs will be initiated as *FAR* contracts under current limitations to Section 845. Once initiated as a FAR contract, mandatory flow-down of *FAR* conditions will discourage participation by innovative commercial companies.

Pending legislative changes to Section 845, *it is recommended that* USD (AT&L) direct the military departments to authorize parallel OT agreements to be used to enter into relationships with commercial ("non-traditional" broadly defined) firms that might contribute to a defense project that is being conducted with a defense prime contractor under a procurement contract. Consistent with policies endorsing the modular open systems approach (and incremental and spiral developments), opportunities should be sought for including commercial firms in prototype and development programs. Parallel OT agreements closely integrated with the main development procurement contract should be funded with any available funds including funds originally allocated to the prime contract.

Training and Education

The defense contracting workforce has primarily been trained in following a set of prescriptive rules that potentially inhibit developing initiative and good business judgment in order to craft transactions advantageous to the DoD while honoring the interests of the DoD's industrial partners. In significant measure, the acquisition workforce is woefully ill-equipped to engage in free-form OT contracting. Both DoD acquisition policy offices and the DoD acquisition education community have failed to provide leadership, incentives and recognition to enable the acquisition workforce to better utilize OTs. Top-level leadership has been absent or insufficient in matters of education and training.

It is recommended that USD (AT&L) engage (through a mandated high-level conference or other means) OSD and service acquisition policy offices, senior acquisition executives, and other key acquisition leaders so as to dispel prevalent misinformation on OTs and initiate leadership education on OTs. The services and defense agencies should initiate OT training and create centers of excellence on innovative contracting emphasizing OTs. The Defense Acquisition University should create a significant on-campus series of courses on innovative contracting emphasizing OTs. DAU online training modules on OTs should be substantially revised and should emphasize the potential flexibility of OTs and how to handle non-standard situations rather than reinforce "look it up in the book" education.

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- Special Termination Liability in MDAPs
- Strategic Sourcing
- Transaction Cost Economics (TCE) to Improve Cost Estimates

Human Resources

- Indefinite Reenlistment
- Individual Augmentation
- Learning Management Systems
- Moral Conduct Waivers and First-tem Attrition
- Retention
- The Navy's Selective Reenlistment Bonus (SRB) Management System
- Tuition Assistance

Logistics Management

- Analysis of LAV Depot Maintenance
- Army LOG MOD
- ASDS Product Support Analysis
- Cold-chain Logistics
- Contractors Supporting Military Operations
- Diffusion/Variability on Vendor Performance Evaluation
- Evolutionary Acquisition
- Lean Six Sigma to Reduce Costs and Improve Readiness
- Naval Aviation Maintenance and Process Improvement (2)
- Optimizing CIWS Lifecycle Support (LCS)
- Outsourcing the Pearl Harbor MK-48 Intermediate Maintenance Activity
- Pallet Management System
- PBL (4)
- Privatization-NOSL/NAWCI
- RFID (6)
- Risk Analysis for Performance-based Logistics
- R-TOC Aegis Microwave Power Tubes

- Sense-and-Respond Logistics Network
- Strategic Sourcing

Program Management

- Building Collaborative Capacity
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Collaborative IT Tools Leveraging Competence
- Contractor vs. Organic Support
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to Aegis and SSDS
- Managing the Service Supply Chain
- Measuring Uncertainty in Earned Value
- Organizational Modeling and Simulation
- Public-Private Partnership
- Terminating Your Own Program
- Utilizing Collaborative and Three-dimensional Imaging Technology

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